

## HERITAGE AND INNOVATION IN SERBIAN 21<sup>ST</sup> CENTURY ARCHITECTURE – GENUINE TRADITIONAL BUILDING TECHNIQUES

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### Abstract

The social integration of people, the common belief of a particular group of people, contributed to the creation of a very fine and sincere architecture, which celebrated the habits and lifestyles of a particular community. National, traditional architecture is not a style, but rather, a glimpse of the world and life, the nature and genius loci, attitude towards life processes and materials, towards climate and authenticity. Traditional construction and building techniques help us establish new innovative architecture, to improve our living conditions in as much as the environment.

**Keywords:** Building techniques; Construction; Innovation; Tradition.

## 1. INTRODUCTION

“Considering traditional architecture as an interaction of: man – his nature, his will, his social organization, his view of the world, his way of life, social and psychological, individual and collective needs, personality, customs; his physical needs, what defines the “functional program”, the available techniques, and nature – physical aspects, climate, location, materials, constructive laws, etc., and external aspects (such as the landscape), it is easily noted that the influence man (especially his personality) exerts over nature is far smaller in primitive and indigenous societies than in our, more developed cultures, and that these influences, to the extent they exist, are not individual or personal, but collective – solely collective in nature. The building of this type seeks to strike a balance with nature, not to dominate it, and it is precisely this that enhances its superiority over stylistic buildings, and hence the study of the relationship between the built environment, man and nature” [1].

## 2. TRADITIONAL CONTRUCTION AND BUILDING TECHNIQUES

Tradition is essentially a collection of experiences and information that are passed down from the past in a particular social and collective context.

The term “tradition” is established, in the words of Thomas Elliot, as a “gift of the past”, as a lesson and foundation for future knowledge and creativity, based on experience [2]. Traditional building is a development of centuries-long experience, “the result of a long and slow process of creation” [3].

Adapting to the regional climate and terrain, simultaneously with local events, social conditions and perceptions, local builders always created an authentic architecture. “Spontaneous thinking and adapting, creative imagination and the skills of self-taught builders from the folk have resulted in habitats of extraordinary adaptability to life, work and the environment” [4].



Figure 1.  
Village houses' types in Yugoslavia. Respectively, from above: The Dinarid loghouse, The bondruk house, The Pannonic rammed earth house, The coastal stone masonry house, The Slovenian loghouse. (Source: Borivoje Milojević (1953) Types of villages and village-houses in Yugoslavia)

The world of traditional building is one of truth and reality, completely out of fashion and marketing. As one lives "so he makes his home. It is believed so, that churches are made as we feel the surrounding nature, so it is built, of stone and upon rock and lake" [5].

### Vojvodina

The Pannonia basin is an exception from spontaneous architectural development influenced by the natural surroundings. Namely, the Austro-Hungarian governors appointed a certain type of house that should be built in this region, during the XVIII century, they regulated streets and planned lots, regulated the orientation of the house towards the street and its yard. The goal was to make a concentrated household on a small space, allow every house a road entry and provide an economic backyard and entrance to the fields. Due to these regulations, the household in Vojvodina were narrow on their front facade, but stretched very deep into the yard.

The typical village home in Vojvodina is a ground floor building, rectangular in shape, with a pitched roof and two so-called "kalkan" walls (extended gable walls, most notable on houses in the Netherlands, where they formed the decorative front facade), one always above the main entry facade. The oldest type of this house had two sections – a room and a kitchen – arranged so the room is facing the street and the kitchen opens to the backyard. In later



Figure 2.  
Traditional architecture in northern Serbia, Vojvodina. (Source: "Naš dom" (Our home), issue No. 6 (June '81), vol.XV ČGP Večer, Maribor 1981, <http://p.calameoassets.com/100826174539-7742ad3ad29f2432447107df74645671/p2.jpg> )

development a porch was added to the house, this porch would become an integral part of every home-stand. The settlers arriving to the southern regions into Vojvodina strived to make their new homes alike to their old ones, homes with a fireplace, one room and a porch, in this way they had influence (little albeit noticeable) on the further development of the "vojvodanka" house. The development came with an increase in the number of rooms and further development of the porch, oriented towards the yard, as a space for living and doing everyday activities. The kitchen started as a half-open fireplace with a chimney attached to a great fireplace in the room, it was usually encircled by a large bench "banak", where the household would gather and sit by the warm of the fireplace.

The street facing room often had two small windows, symmetrically situated, positioned next to the entrance door to the porch, through which one could enter the kitchen and other rooms of the house. The street facade extended gable was made in various ways, from a humble, mildly decorated surface made of planks, to an ornamental surface, sometimes very heavily decorated facade element. This part of the facade was the main characteristic of the house, as it was the only element facing the street, and provides an excellent place for the builder to emphasize the status and wealth of the homeowner, as well as leave his own artistic mark on the local architectural scene. The roof is always gabled, with two steep sides, which provide space for a cellar, which has a small window on the extended gable, for providing light and fresh

air in this otherwise dark space.

The oldest village homes in Vojvodina were built in the “bondruk” style, filled with rammed earth. The roof was covered with straw. These were the so called “nabijače”, or “rammed earth homes”, with a strong wooden “bondruk” skeleton, filled with a mix of earth and chaff (that remained from milling the abundant grain) that was further rammed to be tougher. These houses were clearly only suitable dur-

ing warm and dry days, which in turn meant that in the flood season whole villages would be badly affected. Houses with an adobe filling in the place of rammed earth were much more resistant.

The Rammed earth technique is very old. It utilises the ground in its raw, unbaked state. Walls are erected using a wooden casing 40–50 cm in height, in which the earth is rammed until it can bear weight, then the casing is lifted and the process is repeated. In the old days, the casing had to provide a wall more than 30 cm thick, anything less couldn’t bear the 30 cm height. Now, with modern additives and new technology, walls can be very slim, from 10–25 cm thick. The rammed earth dries out fast, in optimal temperatures it takes only 2–3 days. The earth matures for two years. After this period the wall becomes rock-solid, resembling all the characteristics of a full stone wall.

Rammed earth is also an excellent thermo-isolator for the region of Vojvodina, where it is most common in Serbia. It is even better at isolating sound, being virtually soundproof. Another characteristic for this technique in Vojvodina is the addition of a layer of reeds between the layers of earth; the reeds then act as reinforcement.

The earth is rammed manually, using a shovel or similar tool, and has to be rammed to 50% of its starting height. These walls are very easily repaired, whenever a hole appears it can simply be filled with mud and let to dry out, these improvised patch-ups quickly blend in and cannot be told apart from the rest of the wall.

“Nabijače”, or rammed earth houses are rectangular in shape, 5–6 meters wide and 15–18 meters long. The foundations are made of large bricks. Five layers of brick in the ground, and another 3–5 above the ground.



Figure 3 and 4.  
Rammed earth houses in northern Serbia, Vojvodina.  
(Source: Aleksandar Deroko, Folk architecture in Yugoslavia, Naučna knjiga, Beograd, 1964)



Figure 5.  
Examples of street facing facades of the below mentioned house types – The Small (1), Expanded (2) and Extended (3) house type. The materials, building height and façade decorations show the gradual growth in inhabitants’ wealth and status (Source: M Đekić, “Narodno graditeljstvo Vojvodine: Kuća kao spomenik kulture” (Vernacular architecture in Vojvodina: The house as a cultural monument), 1994, <https://agroplus.rs/serijal-ruralni-turizam-vojvodine-38/>)



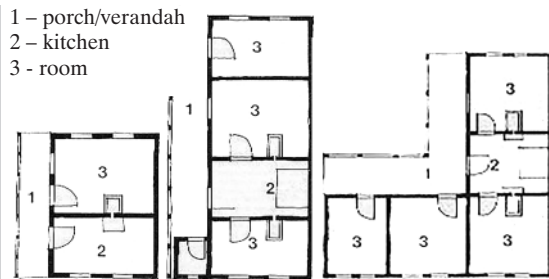


Figure 6.  
Ground floor of the village house in Vojvodina. (Source: "Naš dom" (Our home), issue No. 6 (June '81), vol.XV ČGP Večer, Maribor 1981, <http://p.calameoassets.com/100826174539-7742ad3ad29f2432447107df74645671/p7.jpg>)

The finished foundations were then encased in 20 cm wide wooden planks reinforced with wooden pillars, so the outer, bearing, walls were 50–60 cm thick and the inner walls were 30 cm. The space between these planks was filled with ground, usually dug up near the house or in the garden. The ground was poured to a height of 50 cm.

A thinner layer of chaff was placed above the ground, the layers were then pummelled with wooden mauls, specially made for the occasion to around half the height of the casing, if needed, water was poured on the mixture to make it easier to ram. The process was repeated so the rammed earth was on the same height as the casing planks.

The planks were then raised higher and the ramming was repeated until the building reached up to 2.5 meters in height. The interior walls were a bit lower, around 2.40 meters. It is evident that these houses were lower than modern houses, with an average ceiling height of 2.80 m. It is interesting, however, that these walls were raised entirely without openings for doors or windows. In the place of the upper frame of the future doors and windows small planks were placed and the building process carried on. After the wall dried out, the small planks indicated the places to be knocked down and filled with the windows and doors. The building work was usually done during the summer months, when there was little danger of flash floods or the rise of underground water levels, which could influence the sturdiness of the foundations. When the walls were raised, the simple gabled roof was built, and so the house was complete.

### Central Serbia

The aforementioned map (Fig. 1) shows that the territory of Central Serbia never had a unique type of house, but rather, that its western part is dominated by the loghouse, and in the south and east, the "bon-druk" house is dominant. These house types present some of the simplest and most basic forms of architecture in central Serbia. However, in time, as the people's needs grow, these basic types get annexes and attachments, like the entrance porch and additional rooms, and so new, more complex house types, like the "Šumadija" and "Morava" house come to existence. There have already been mentioned of the factors influencing the development of the "brvnara", loghouse in this region, the main reasons being the proximity of large forests and woodland in the mountainous regions, and the local climate, in which a warm shelter was needed, to protect from the snow, cold and overall severe climate.

The interior floor is just ground, sometimes with additional cover, the roof is also made of simple constructive elements, just a ridge carried by two buttresses, with smaller horizontal planks forming a more complex skeleton, that is covered with wooden shingles that come as a by-product of the plank manufacture.

The loghouse walls were built with whole round logs, with no modifications, however in time, more rationalized use of wood resulted in the use of half-logs, with dents, or even planks. The way these half-logs interconnected at the houses corners was quite specific.

Often used techniques were the "čert" (dovetail cut-out) also known as "usijek" – "cut-out" (logs with dented joints at their ends), connecting via "u nizu" (in rows, where one log has a chiselled extension which fits into a dent in a shared vertical log – like in 6.5; 6.6, in cases when the "na unizu" technique is not employed, logs are stacked atop one another, without a shared vertical log pillar – like in 6.1; 6.3), and the "uvo" – "ear") connecting style. The most common was the „usjek“, a technique where two logs were dented in ¼ of their height both on top and bottom, so they can lay on top of one another. All of these techniques can be seen illustrated in Fig. 7.



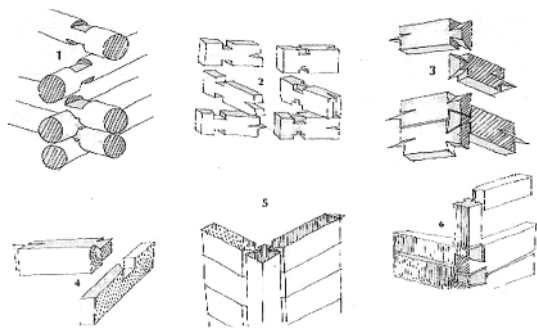


Figure 7.

Wooden joining types used in traditional loghouses: 1. Cut-out, (usjek) log bonding, 2. Two ways of forming cut-out, (usjek) bond between beams, 3. Dovetail cut-out, (čert) bonds between beams, 4. The base dovetail cut-out (čert) bond between two interior walls, 5. Dado joint between beams and a common pillar (na unizu) used in construction of „talpara” houses, 6. Basement dovetail bond (čert) between walls that share a common pillar (na unizu). (Source: Ranko Findrik, Folk architecture – Housing, Museum Old Village, Sirogojno, 1994)

Loghouses were always built as independent homes, usually with only a ground floor. The outer facade was made of logs and had the characteristic appearance, whilst the interior walls were filled by a mixture of mud and smaller bits of wood, remains from working with the logs. Hence, the loghouse was a square shaped home, made of raw logs or manufactured planks that fit in perfectly together on the corners via use of indents, forming a tight bond that prevents any deformations of the wall.

The roof is very steep, a characteristic influenced by the heavy snowfall in the region, as well as the roofs

own constructive skeleton and shingles.

The interior of these homes is very simple. It consists of one rectangular room with a fireplace in its centre, the fireplace placed so it is equally spaced from the outer walls. Two doors on opposite sides of the home connect the home with its surroundings and help ventilate the room quickly and efficiently. The presence of windows is optional, and if they are made, they aren't glass windows, but are covered with animal hide – a paunch. These mountain houses are sometimes situated on steep terrain or even ridges, which allows for a level below ground, which acts as a basement or larder, or stables that is in part dug in, to level the terrain. In somewhat rare occasions the loghouse had a front porch; seldom did it have a second floor.

It is an established fact that the first houses in Serbia were loghouses with one room. Later, the famous woodworkers from Osat, in Eastern Srpska, Bosnia, arrived and started building “their” famous “osaćanka” houses in the Šumadija region, these houses were later expanded with the addition of new rooms.

Namely, there was a need for an isolated sleeping room, so the multi-room house becomes the new common village home, with additions according to the needs of its inhabitants, their age, craft and lifestyle. The cellar, however, was never a room for itself, without a ceiling separating it from the floor below.

On the other hand, people in the eastern regions of Serbia, i.e. the area around Pirot built so called “pletara's” (knitted house) “čatmara's” (mud and straw



Figure 8 and 9.

Loghouse on mount Tara, left and in Sirogojno, on the mount of Zlatibor, right (Source: Ranko Findrik, Folk architecture – Housing, Museum Old Village, Sirogojno, 1994)

house), and “**bondruk**” houses. In the second half of the XIX century craftsmen from Osat, Pirot and Kosovo meet one another on the terrain, and alongside them, their techniques and building traditions meet as well. A result of this meeting of styles are new house types, combinations of the basic ones – **semi-loghouses**, **semi-čatmare** – further influenced by the terrain and region.

As we could already see, various housing types developed dependent on the terrain morphology in central Serbia. One of the most common shapes of these new combined houses was the half-loghouse half-“**bondruk**” house. This house had one half made like a mountain loghouse, with sturdy walls made of planks, and the other made using the “**bondruk**” technique, all covered by baked brick shingles, characteristic for the “**bondruk**” house. One could also argue that this house type is so common in central Serbia because it offers a range of benefits, mainly being a very practical solution suitable to the local climate and other factors.

The basic residential house type in the central, eastern and southern regions of Serbia, as well as some parts of Bosnia and Macedonia is the “**bondruk**” house. This type of house is well suited for the mild climate and more levelled terrain (compared to that of western Serbia).



Figure 10.  
The semi-loghouse. (Source: Ranko Findrik, Folk architecture – Housing, Museum Old Village, Sirogojno, 1994)

This is why the houses are covered in a mud finish and have a longer roof, with eaves, to provide protection from heavy rain and the burning sun. The base of the house is composed of the stone clad basement (the basement starts a bit above the ground, for sunlight and ventilation purposes) and a few stone slab stairs leading to the interior living space. The stone basement is usually adapted to a small slope in the



Figure 11.  
“Bondruk” house. (Source: Photos of old Belgrade 1850–1960, <http://www.skyscrapercity.com/showthread.php?t=406398&page=893>)

terrain, but can also appear visible in completely flat terrain, where it serves as a kitchen, and thus needs to stick out of the ground a bit, to allow for windows to be mounted.

The main feature that made the “**bondruk**” house unique was the constructive system – a light wooden skeleton, composed of beams and pillars in a, usually, orthogonal matrix, and a few diagonal beams to make the light system sturdier to horizontal forces of nature, like strong winds and earthquakes.

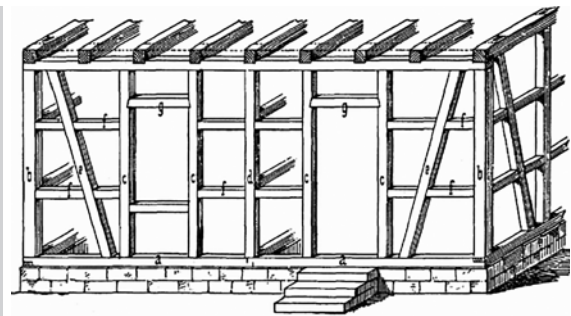


Figure 12.  
“Bondruk” house. (Source: Photos of old Belgrade 1850–1960, <http://www.skyscrapercity.com/showthread.php?t=406398&page=893>)

Thanks to these diagonal beams, these houses were quite resistant to earthquakes that happened from time to time. The casing pillars are placed in a raster with 1.0–1.5 m of spacing between them. These square pillars are not very thick, their common dimensions range from 12/12 to 18/18 cm. The other beams (horizontal and diagonal) are of similar dimensions. After the skeleton is placed, the space between beams is filled in various ways, with materials that are at hand: earth mixed with animal faeces

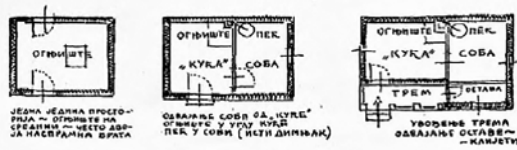


Figure 13.

Development of the village home: (1) The first picture shows a basic home with only one room – the fireplace, which forms the base of all larger homes. It usually had two doors on opposite sides. (2) The second picture shows the evolution of the base, where the fireplace was moved to one of the corners and a chimney added on top of it, along the base room, another small multifunctional room is added. Since the fireplace is no longer in the middle of the house, the second entry door is eliminated for practicality. (3) The third evolution is marked by the addition of a front porch and small storehouse along the room. This was a wealthier home, and as such it needed more space for the inhabitants' crafts and provisions. (Source: Ranko Findrik, Folk architecture – Housing, Museum Old Village, Sirogojno, 1994)

(to make it stronger) and straw, weaved thin willow branches, small cornel branches – these fit together in a manner that traps air between them, acting as thermal insulation and increases the houses sturdiness.

The older type of porch had wooden pillars and no arcades, however, on the territory around the Morava Rivers a porch with decorative arcades is a common sight. These arcades have a purely decorative role. The roof is covered with specific curved brick tiles (locally known as “ćeramida”). These tiles are quite heavy so they require a gentler sloped roof, this suits the region perfectly, as there is never too much snow here. Gable walls are completely absent, so the common house has a 4-sided roof, without a cellar. Like loghouses in the hilly areas, these homes were made to be free-standing objects with surrounding yards, dislocated from roads – the complete opposite of houses in Vojvodina. The amorphous layout of houses, influenced by the terrain, didn't allow for streets to form between them.

Due to the light system of building, it is very easy to add modifications later on – consoles, eaves etc. – to the upper floors. The facade is usually clad in mud mortar, but in some cases the constructive skeleton is left vulnerable to outside factors, so it has to be protected. The skeleton itself has to look appealing and be resistant to the elements.

“Bondruk” houses in the region, the Oriental-Balkan “bondruk” houses are painted with white paint over the mud mortar finish layer. This type of wall is made more resistant to wind, rain and sunlight with the addition of wide eaves. Often it is as much as 2 m wide. The

eaves, along with the porch it covers and fence are an important element in this type of simple, everyday architecture, for it is an excellent place for nicely carved wooden elements. The covered porch also has a practical use, as a storage area, where the owner keeps his tools, or a place for drying fruits and vegetables for later use, and a useful interspaces between the house and its yard, a space where the farmer can rest and even sleep during the warm periods.

Great ethnic diversity in the region provided fertile ground for the development of many varieties of the basic house type in Central Serbia (the loghouse); among the most notable of these varieties is the Šumadija house. It is an upgrade of the loghouse, and as such, it took its place as the common house in Central Serbia. It was square shaped and consisted of a ground floor and basement. The bedrooms had an entrance on the porch, which is elevated a few steps above the ground. This type of house was built of brick or stone, it had a four-sided roof covered in brick tiles or shingles. The shingles were a special type off brick: they were first dried, in the open air or in special rooms used for drying agricultural products, after they were completely dry, they were placed in a furnace and baked as well.

Probably one of the most beautiful styles that evolved from the Dinaric loghouse is the Morava style, common both in the countryside and in towns. It was built mostly in regions that didn't have large forests nearby, and as such, lacked the resources needed for a typical loghouse. This region is located along great rivers, which meant they had an abundance of shrubs, small bushes and reeds, which meant that the house was built mostly using small branches and logs. The Morava house was common on a large territory, sprawling between two rivers: Western Morava (in the west, as its name suggests) to Timok in the east, along the flow of Southern Morava to the region around Skoplje. The base of this house is also a square, the walls are made of bricks or woven branches (the local “pleter”, knitting technique). The roof is covered with planks or shingles, and has at least one chimney. Wood was used only for the roof, entrance gate, tools and some agricultural storage buildings (for corn, hay, shamrock...) as it was not readily available in large quantities, and the walls were made of baked clay. A special aesthetic character of these houses is the white colour they are painted in. The floor was made of wooden planks or rammed earth.

The Morava house differs from the mountain loghouse both in terms of size and position. Namely, the loghouse was situated on a slope and utilised the





Figure 14 and 15.

The oldest house in Šumadija, Botunje near Kragujevac, 18<sup>th</sup> Century (Source: The oldest authentic house in Šumadija, stills from the movie <http://www.youtube.com/watch?v=Rrp06WtWq-o>)

space above its foundations as a basement. The slope meant that on one side, the ground floor was on ground level, and on the other, the basement was on ground level. The Morava house, however, is made on flat terrain. The basement is usually half dug-in, which means the ground floor is actually a few steps above the ground. The Morava house is larger than its mountain counterpart, simply because the terrain allows it.



Figure 16.

The Morava house. (Source: Branislav Kojić, *Rural architecture: theory and elements. Građevinska knjiga, Beograd, 1973*)

The interior is basically composed from three parts, the porch, the house and the room. The porch – or *ajat*, or *vajat*, as it is called locally – is interspaces that lead to the house, the great room with a fireplace. The porch has a distinctive arcaded outer wall. This wall is the focal point for the artistic skills of the builder. The kitchen is separated from the great room, there are a few cases where the two spaces aren't separated, and then there are small interspaces for storing tools, clothes and shoes. The amount of rooms (bedrooms) was dependent on the number of

household. The cellar was a storage space for rarely used objects. The Morava house is associated with close-knit settlements, without a large backyard, with no agricultural additional buildings.

#### *Kosovo and Metohija*

The oldest and most basic house type in the region is so called “**prizemljuša**” (literally “ground floor house”), recognizable by having a porch oriented towards its backyard. The house is entered through the porch. The first room one enters is the great room with the fireplace, there is usually a second room next to this one. Livestock pens were usually under the same roof. The old houses were covered by a thatched/straw roof. The porch came as a very early development in the local architecture and is always along the longer side of the house. This positioning of the porch led to further expansion of the house, so new rooms and annexes were added along it. One of the features of a fully expanded house would be a full wall (without openings) on one side of the porch.

The populace lived in specific “**towers**”, massive square forms built of stone. This type of home was meant to act as a defence in harsh times. The shape can be traced to medieval times, when these towers were used as residencies. The entrance was usually high on the tower, with a retractable ramp leading to it; this ramp was lifted during night, leaving the entrance safe from invaders. The ground floor was home to livestock, whilst the upper floors were used for living and working. The living space was made of log walls, covered by a wooden shingle roof. A special element, mainly aesthetic, was the open wooden gallery on top of the tower, decorated with fine woodwork, small arcaded walls and a sitting bench.

The Turkish rule in southern Serbia had a consider-



Figure 17 and 18.

Ganića tower in Rožaje, left (beginning of the 19<sup>th</sup> Century) and Redžepagića tower in Plav, right (15<sup>th</sup>–17<sup>th</sup> Century). (Sources: Wikimedia Commons Rožaje Ganića Kula, [http://commons.wikimedia.org/wiki/File:Rožaje\\_Ganica\\_Kula.JPG](http://commons.wikimedia.org/wiki/File:Rožaje_Ganica_Kula.JPG) and Portal Montenegrina, Plav Kula Redžepagića, <http://montenegrina.net/fokus/plav-kula-redzepagica/>)



Figure 19 and 20.

Master Jovan's konak in Čačak, left (1835) and Radul Bey's konak in Zaječar, right (before 1833). (Sources: National Museum Čačak, Residence of Jovan Obrenović, [https://www.cacakmuzej.org.rs/en/residence\\_of\\_jovan\\_obrenovic.html](https://www.cacakmuzej.org.rs/en/residence_of_jovan_obrenovic.html)) and Naj Zaječar – Radul Begov konak, <http://www.srpskilegat.rs/radul-begov-konak/>)

able impact on the forming of regional architecture as we now know it. Up until the Turkish invasion, houses in the region were built mostly using the simple “bondruk” technique filled with unbaked brick; the facade was clad in mud and sometimes had a white paint finish. If there was stone near the site, it was used as roofing or some walls were made of it. However, this building concept will mix with oriental ways of building, mostly in towns, and leave its mark on future houses, not only in the region, but across the country. **“A new architecture is born in those towns. It wasn’t a wholly new concept, but an extension of byzantine, better said – oriental concept”** [6].

Actually, “bondruk” was the pure opposite of the expensive, monumental architecture of churches and palaces; it was a fast and economic way to build homes. The rooms all gravitated towards the centre, the vertical plan was also simple, usually just a ground floor and one floor above, at most. The urban way of life has its needs, so households with one floor, sometimes over hanged above the street, workshops or inns in the ground floor were dominant in towns in the XVIII and XIX century.

Oriental townhouses were built by local build-masters as well; they had more rooms than their counterparts in villages. They all had wooden constructive



elements, no matter the status of their owner. The social status had impact on the facade, however. The poorer houses resembled homes in the countryside, with mud clad brick walls, sometimes painted white. Wealthier citizens' homes often had wooden overhanged extensions (locally known as "doksats" and "čardaks"). These wealthy homes have ground floors clad with easily chiselled sandstone and very nice carved wooden elements: doors, stairwells and beams.

These homes always have a large central space for gatherings – the divanhana. The most flamboyant may even be surrounded by splendid gardens and smaller service buildings. Oriental homes are usually free-standing objects, but when placed in a tight area of a town they can share a wall with their neighbour. Depending on the terrain, houses could be formed in a terrace-like formation, meaning that there could be any windows and openings on the facade.

The house is made of usual constructive elements. The walls are 50 cm thick, made of unbaked bricks and clay mortar bounded with wooden bars – "hatulas". The upper wall – the "brkatica" – is composed of a wooden skeleton filled with a row of bricks or clay bounded with small beams. The filling can also be composed of rounded wooden pieces, cased in smaller beams and covered in mortar. Crossed beams form the base of the ceiling which is covered by wood planks.

The ground floor ceiling is usually painted white, with the exception of wealthier homes, where it can be covered by a decorative crosshatch of small wooden

planks. The first floor has an overhang, which stretches like a console over the street or front yard. This area is called "the corner", in the interior. On the exterior the "corner" is held on wooden pillars and beams which are often further masked in decorative planks that sometimes make a vault between the two floors [7].

The roof is held on a complicated system of beams, in which the main bearing beams are bounded together at the top, on top of this construction there are smaller beams, which are the base for the roof tiles – ćeramida, semi-circular brick tiles. Due to the mild climate, with more rain than snow, the roofs are less steep and have wide overhangs that protect the facade from rain [8, 9].

### 3. CONCLUSION

The materials, construction and building techniques in our immediate vicinity are more than enough for the appetites of contemporary man, it is also completely realistic in the developments and building of single-family homes [10, 11].

Despite the fact that modern times require more materials for construction when natural materials are used (for example for the construction of full wooden framework) we should strive to adhere to the laws of nature and make a sort of symbiosis with it when it comes to building homes. Laws such as the Golden ratio, symmetry, asymmetry, even the materials themselves find a way to determine our habitat, in such a way that the habitat becomes absolutely healthy, comfortable and beautiful living space [12, 13, 14].

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**Figure 21.** Radul Bey's konak in Zaječar (before 1833). (Source: Town house of the Balkan type in Serbia, <http://www.skyscrapercity.com/showthread.php?t=1488803>) and Naj Zaječar – Radul Begov konak, <http://www.srpskilegat.rs/radul-begov-konak/>



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